

CT-5142 2-channels encoder /differential input

1 Module features

- ◆The module supports two channels of encoder input.
- ◆Each encoder channel supports A/B incremental encoder or pulse-directional encoder input.
- ◆Each encoder channel supports orthogonal A/B differential signal input, voltage input range 0-5V.
- ◆The incremental encoder mode supports x1/ x2 / x4 frequency multiplication mode.
- ◆The pulse - direction mode supports nondirectional signal, pulse input only.
- ◆Each encoder channel supports 1 digital input signal with an input voltage of 5Vdc or 24Vdc.
- ◆Each encoder channel supports 1 digital output signal with an output voltage of 24Vdc.
- ◆The module internal bus and field input adopt magnetic isolation.
- ◆The module carries 16 LED indicators.
- ◆The maximum input frequency of the encoder supported by the module is 10MHz.
- ◆The module supports measurement function; it could detect the load speed or input signal frequency.

2 Technical parameters

General Parameters	
Power	Max.65mA@5.0Vdc
Isolation	I/O to internal bus: magnetic isolation (3KVrms)
Field Power	Nominal:24Vdc, Range: 19.2~28.8Vdc
Wiring	Max.: AWG 18
Mounting Type	35mm DIN-Rail
Size	115*14*75mm
Weight	65g
Environment Specification	
Operating Temperature of Vertical Installation	-35°C~60°C
Operating Temperature of Horizontal Installation	-35°C~70°C
Relative Humidity	5~ 95%RH (No Condensation)
Storage Temperature	-40°C~85°C
Storage Humidity	5~ 95%RH (No Condensation)
Manufacturing Test Temperature	-40°C~75°C
Ingress Protection Rating	IP20
Input Parameters	
Channel Number	2-channel encoder
LED Indicator	16 channel input LED indicator
Encoder Signal Type	Differential input, voltage input range of 0-5V
Encoder Filtering Time	Default 0.5us
Encoder Count Frequency	<10MHz
Encoder Frequency Multiplication Mode	x1/x2/x4
Encoder Measurement Function	Load speed or input signal frequency measurement
DI Turn-on Voltage	Min.5Vdc to Max.28Vdc
DI Turn-off Voltage	Max.2.7Vdc
DI Turn-on Current	Max.5mA/ channel @28V
DI Input Impedance	>10.0kΩ
DI Input Delay	OFF to ON: Max.3ms ON to OFF: Max.2ms
DO Output Voltage	24V, range ±10%
DO Output Current	Max.500mA
DO Output Sink Current	Max.5uA

 WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not exceed any of the ratings specified in the environmental and electrical characteristics table.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

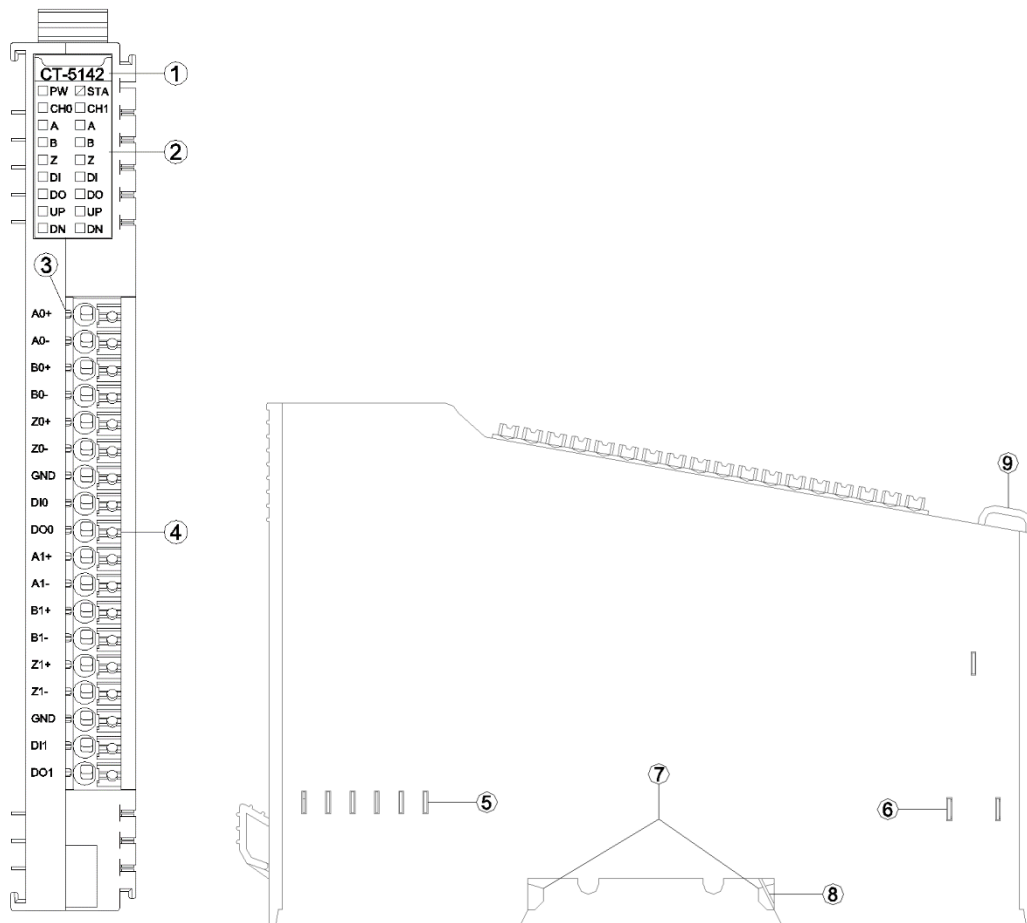
 AVERTISSEMENT

FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Ne dépassez aucune évaluation spécifiée dans le tableau de caractéristiques environnementales et électriques..

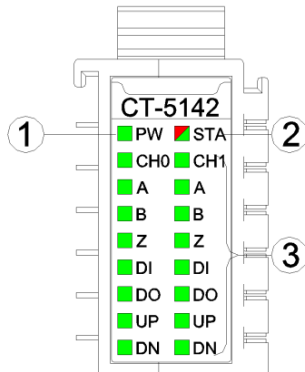
Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.

3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Spring Sheet
- ⑨ Fixed Wiring Harness

3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Input channel indicator LED (green)

PW Power State	Definition
ON	Internal bus power supply normal
OFF	Internal bus power supply failure
STA Module State	Definition
Green slow flash (2.5 Hz)	Module internal bus is not started
Red slow flash (2.5 Hz)	Module internal bus offline
ON (GREEN)	Operation normal
Flash (2.5 Hz) (RED/GREEN)	updating mode
Flash (10 Hz) (RED/GREEN)	firmware update
Double Flash (RED)	Module exception has been soft-restarted
CH0 CH1 channel indicator LED	Definition
ON	Channel enable
A B Z Encoder signal indicator	Definition
Flash	Pulse signal input detected
ON/OFF	Pulse signal input not detected
DI input indicator	Definition
ON	Input signal high level
OFF	Input signal invalid
DO output indicator	Definition
ON	Output signal high level
OFF	Output signal invalid
UP indicator	Definition
ON	Encoder in positive rotation
OFF	Encoder is stationary or in contrarotation
DN indicator	Definition
ON	Encoder in contrarotation
OFF	Encoder is stationary or in positive rotation

WARNING

UNEXPECTED EQUIPMENT OPERATION

By viewing the PW indicator, could determine the power supply status of a module. If the PW is steady green, the power supply is normal. Otherwise, the module cannot work properly.

When the module is initially powered on, there will be 3S for the backplane bus connection. After the backplane bus is initialized, STA is in the green steady state. If STA is in the green blinking state, it indicates that the backplane bus has not been initialized, and it needs to be powered off and restarted for re-initialization.

STA abnormal working state occurs during the normal operation of the module, please check the firmware version information of all modules, and consult ODOT technical support for details.

If a module is upgraded, check that all modules are in the normal state after the upgrade. Otherwise, an exception may occur.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

AVERTISSEMENT

FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

En regardant l'état de l'indicateur de PW, jugez l'état d'alimentation du module. Le feu vert PW reste allumé et l'alimentation est normale. Autrement, le module ne fonctionnera pas correctement.

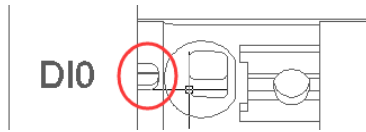
Lorsque le module est alimenté initialement, il y aura 3S pour la connexion de bus de backboard. STA est un état vert permanent après l'initialisation du bus de backboard. Si STA est en état de clignotement vert, cela signifie que l'initialisation du bus de backboard n'est pas passée et doit être redémarrée hors tension et réinitialisée.

L'état de fonctionnement anormal de STA se produit pendant le fonctionnement normal du module, veuillez vérifier les informations de version du firmware de tous les modules, et consulter le support technique ODOT pour plus de détails.

Si le module a une opération de mise à niveau, après l'achèvement de la mise à niveau, le besoin de vérifier que tous les modules sont dans l'état normal avant de courir, sinon il conduira à une exception.

Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.

3.2 Field channel LED indicator (Green)



When the input signal of the input channel is valid, the corresponding field channel indicator is on (only the DI/DO wiring terminal of the encoder channel carries the indicator).

3.3 Terminal definition

Terminal Number	Symbol	Description
1	A0+	CH0 encoder phase A input +
2	A0-	CH0 encoder phase A input -
3	B0+	CH0 encoder phase B input +
4	B0-	CH0 encoder phase B input -
5	Z0+	CH0 encoder phase Z input +
6	Z0-	CH0 encoder phase Z input -
7	GND	Signal ground
8	DI0	CH0 digital signal input
9	DO0	CH0 digital signal output
10	A1+	CH1 encoder phase A input +
11	A1-	CH1 encoder phase A input -
12	B1+	CH1 encoder phase B input +
13	B1-	CH1 encoder phase B input -
14	Z1+	CH1 encoder phase Z input +
15	Z1-	CH1 encoder phase Z input -
16	GND	Signal ground
17	DI1	CH1 digital signal input
18	DO1	CH1 digital signal output

WARNING

UNEXPECTED EQUIPMENT OPERATION

Calculate the maximum field power current consumption of a single module based on the actual field load. If the total field power current consumption of all I/O modules exceeds the power supply capacity of the field power supply, you must add an extra power expansion module. Otherwise, an output channel exception may occur.

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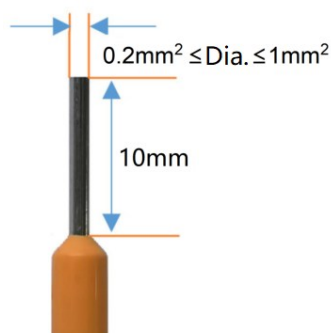
! AVERTISSEMENT

FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Calculez la consommation maximale de courant de champ d'un seul module en fonction de la charge de champ réelle. Si la consommation totale de courant de champ de tous les modules d'E/S dépasse la capacité d'alimentation de l'alimentation de champ, vous devez ajouter un module d'extension de puissance supplémentaire. Dans le cas contraire, une exception de canal de sortie peut se produire.

Le fait de ne pas suivre les instructions peut entraîner une défaillance de la protection fournie par l'équipement, ce qui peut entraîner des conséquences graves, comme des blessures ou des dommages à l'équipement.

When connecting a cold-pressed terminal, the terminal must be terminated and checked in strict accordance with the corresponding termination specifications or requirements, and connect the cold-pressed terminal according to the corresponding node serial number. The conductor should use copper conductor and the conductor core should be larger than 0.2mm^2 and smaller than 1mm^2 (AWG18~AWG24). Cold-pressed terminal parameters are as follows:



! WARNING

UNEXPECTED EQUIPMENT OPERATION

Strip the length of the conductor insulation layer is greater than 10mm to ensure reliable signal connection.

The wire needs to use copper wire and the wire core is greater than or equal to 0.2mm^2 and less than or equal to 1mm^2 to ensure reliable signal connection.

When connecting a cold-press terminal, connect the cold-press terminal strictly in accordance with the corresponding termination specifications or requirements, and connect the cold-press terminal according to the corresponding node serial number.

Do not power on cold-press terminals until they are properly connected or fully locked.

Failure to follow instructions specified by the manufacturer may result in serious

consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

AVERTISSEMENT

FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

Dépouillez la longueur de la couche isolante du fil plus de 10mm pour assurer la connexion fiable du signal.

Le conducteur doit utiliser le fil de cuivre et le noyau de fil est supérieur ou égal à 0,2 mm², inférieur ou égal à 1mm², afin d'assurer la connexion fiable du signal.

Lorsque les terminaux de presse à froid sont terminés, ils doivent être terminés et visualisés en stricte conformité avec les spécifications ou les exigences correspondantes et terminés selon le numéro de série de noeud correspondant.

Il est interdit d'activer les bornes à froid avant qu'elles ne soient correctement articulées ou complètement verrouillées.

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DANGER

FIRE DANGER

Use the correct wiring rules only for the maximum current capacity of the I/O channel and power supply.

Failure to follow instructions specified by the manufacturer may result in serious consequences such as death, personal injury, or damage to equipment since the protection provided by the equipment may be impaired.

WARNING

UNEXPECTED EQUIPMENT OPERATION

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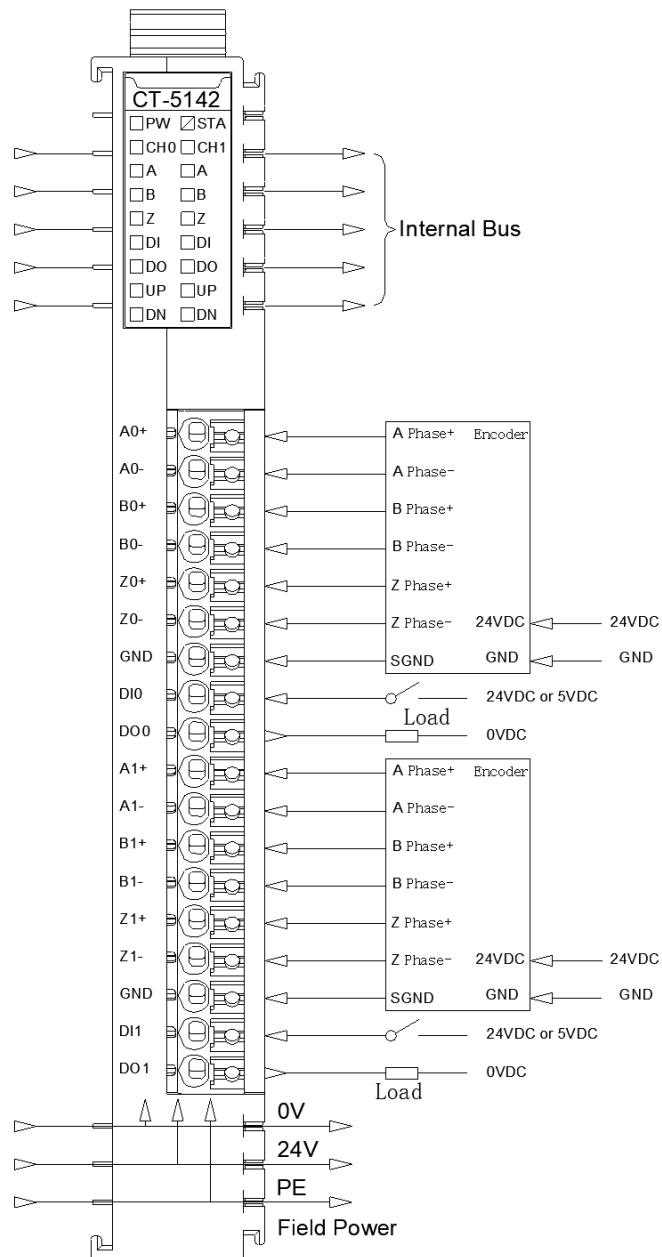
AVERTISSEMENT

FONCTIONNEMENT INATTENDU DE L'EQUIPEMENT

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4 Wiring



NOTICE

EQUIPMENT INOPERABLE

Do not crimp the spring terminal with more than the maximum pressure specified for the terminal. Otherwise, the resilience of the spring terminal may be damaged and the terminal rebound may be affected.

Do not press the spring terminal with a sharp tool when removing cable from the channel. Otherwise, the spring terminal will be damaged.

Failure to follow these instructions may result in equipment damage.

5 Process data definition

< 2 Analog Input (Encoder) > Submodule process data definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Counter DOWN Ch#0	Counter UP Ch#0	Counter Underflow Ch#0	Counter Overflow Ch#0	DI Ch#0	Z Ch#0	B Ch#0	A Ch#0
Byte 1	Reserved							
Byte 2	Counter DOWN Ch#1	Counter UP Ch#1	Counter Underflow Ch#1	Counter Overflow Ch#1	DI Ch#1	Z Ch#1	B Ch#1	A Ch#1
Byte 3	Reserved							
Byte 4	Counter value Ch#0							
Byte 5								
Byte 6								
Byte 7								
Byte 8	Capture value Ch#0							
Byte 9								
Byte 10								
Byte 11								
Byte 12	Measurements 1 Ch#0							
Byte 13								
Byte 14								
Byte 15								
Byte 16	Measurements 2 Ch#0							
Byte 17								
Byte 18								
Byte 19								
Byte 20	Counter value Ch#1							
Byte 21								
Byte 22								
Byte 23								
Byte 24	Capture value Ch#1							
Byte 25								
Byte 26								
Byte 27								
Byte 28	Measurements 1 Ch#1							
Byte 29								
Byte 30								
Byte 31								
Byte 32	Measurements 2 Ch#1							
Byte 33								
Byte 34								
Byte 35								
Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 0	Reserved	Flow Clear Ch#0	Counter Set Trigger Ch#0	DO Ch#0
Byte 1	Reserved			
Byte 2	Reserved	Flow Clear Ch#1	Counter Set Trigger Ch#1	DO Ch#1
Byte 3	Reserved			
Byte 4	Set Value for Counter Ch#0			
Byte 5				
Byte 6				
Byte 7				
Byte 8	Set Value for Counter Ch#1			
Byte 9				
Byte 10				
Byte 11				

Data description:

Input data definition:

A/B/Z Ch#(0-1): The position is 1 when the corresponding channel A/B/Z input signal is valid, and 0 when the input is invalid.

DI Ch#(0-1): Digital input signal status.

Counter Overflow Ch#(0-1): Counter overflowed flag bit.

Counter Underflow Ch#(0-1): Counter underflows flag bit.

Counter UP: Encoder positive rotation, counter up counting sign.

Counter DOWN: Encoder contrarotation, counter down count flag.

Counter Value Ch#(0-1): Pulse count value, 32 - bit signed integer, automatically clear after overflow.

Capture value Ch#(0-1): Pulse capture value, 32-bit signed integer, and when DI is set to capture, the pulse count value will be captured to the capture value at the selected edge.

Measurements 1 Ch#(0-1): Measurement value 1, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Measurements 2 Ch#(0-1): Measurement value 2, the measurement value will be

output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Output data definition:

DO Ch#(0-1): Digital output channel control.

Counter Set Trigger CH#(0-1): Counter set trigger bit, rising edge trigger counter set, the output value **Set Value for Counter** will be updated to **Counter Value**, this function can be used to set the initial value of the counter.

Flow Clear CH#(0-1): Overflow clear bit, the rising edge can clear the input **Counter Overflow** and **Counter Underflow** flag bits.

Set Value for Counter Ch#(0-1): Counter set value.

6 Configuration parameters definition

<2 Analog Input (Encoder) > Submodule configuration parameter definition

Configuration Parameter								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved					16Bit Data Format	32Bit Data Format	
Byte 1	Reserved					Work Mode Ch#0		
Byte 2	Reserved						Frequency Multiplication Ch#0	
Byte 3	Reserved			Filtering Time Ch#0				
Byte 4	Reserved							Counter Storage Ch#0
Byte 5	Reserved							DI Function Selection Ch#0
Byte 6	Reserved						Capture Mode Ch#0	
Byte 7 ... Byte 16	Reserved							
Byte 17	Reserved					Speed Measurement Time Ch#0		
Byte 18	Reserved		Measurements 2 Type Ch#0			Measurements 1 Type Ch#0		
Byte 19	Encoder Resolution Ch#0							
Byte 20								
Byte 21	Transmission Ratio Active Ch#0							
Byte 22								
Byte 23	Transmission Ratio Slave Ch#0							
Byte 24								
Byte 25 ... Byte 32	Reserved							
Byte 33	Reserved					Work Mode Ch#1		
Byte 34	Reserved						Frequency Multiplication Ch#1	
Byte 35	Reserved			Filtering Time Ch#1				
Byte 36	Reserved							Counter Storage Ch#1
Byte 37	Reserved							DI Function Selection Ch#1
Byte 38	Reserved						Capture Mode Ch#1	

Byte 39 ... Byte 48	Reserved		
Byte 49	Reserved		Speed Measurement Time Ch#1
Byte 50	Reserved	Measurements 2 Type Ch#1	Measurements 1 Type Ch#1
Byte 51	Encoder Resolution Ch#1		
Byte 52			
Byte 53	Transmission Ratio Active Ch#1		
Byte 54			
Byte 55	Transmission Ratio Slave Ch#1		
Byte 56			
Byte 57 ... Byte 64	Reserved		

Data description:

16Bit Data Format: Byte transfer order of channel state. (Default: 0)

0: A-B

1: B-A

32Bit Data Format: The byte transfer order of a channel count value. (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

Work Mode Ch#(0-1): Working mode of encoder. (Default: 0)

0: Incremental encoder mode.

1: Count direction mode.

2: Count up mode.

3: Count down mode.

Frequency Multiplication Ch#(0-1): Frequency multiplication number (available only in incremental encoder mode), according to this mode it could output pulse count value. (Default: 2)

0: frequency multiplication 1

1: frequency multiplication 2

2: frequency multiplication 4

Filtering Time Ch#(0-1): Encoder input filter time (default: 5)

0: no filter

1: 0.1uS

...

5: 0.5 uS

...

31: 3.1 uS

Counter Storage Ch#(0-1): Enable storage. When the storage function is enabled, the IO module will save the count value to the non-volatile memory in real time, and load the last saved count value at the next power-on. (Default: 1)

0: Disable

1: Enable

DI Function Selection Ch#(0-1): DI function selection (Default: 0)

0: Normal DI function

1: Pulse capture function

Capture Mode Ch#(0-1): Capture mode (default: 0)

0: Rising edge capture

1: Falling edge capture

2: Double edge capture

Speed Measurement Time Ch#(0-1): Speed measurement period (Default: 6)

0: 10mS

1: 20mS

2: 50mS

3: 100mS

4: 200mS

5: 500mS

6: 1000mS

7: 2000mS

Measurements 1 Type Ch#(0-1): Measurement value 1 Type selection (default: 0)

- 0: No measurements
- 1: Measuring speed (min/rotation)
- 2: Measuring frequency

Measurements 2 Type Ch#(0-1): Measurement value 2 Type selection (default: 0)

- 0: No measurements
- 1: Measuring speed (min/ rotation)
- 2: Measuring frequency

Encoder Resolution Ch#(0-1): Encoder resolution (default: 1)

Value range: 1-65535

Transmission Ratio Active Ch#(0-1): 1) Transmission ratio (main) (Default: 1)

Value range: 1-65535

Transmission Ratio Slave Ch#(0-1): Transmission ratio (main) (Default: 1)

Value range: 1-65535

A Dimension drawing

